



Office Action Response.

A New copy of application is being provided with corrections and with additional flow diagrams that address items 1-8. It is now double spaced as requested and a page break has been inserted at the end of the abstract page. The abstract page is the first page of the patent submission and is a separate page. We have included a new section called Specification Summary to directly address Item 4. It is at the end of the submission as required by 35 USC 112 and suggested by the office action. We have also included flow diagrams in the specification section to resolve Item 5-6. We have removed all the items identified in Item 7 or changed the language to make it clear that we were trying to provide illustrative actions and not to make the language indefinite.

Item 8 – changes were added in most cases to explicitly identify these as specific method names. In this context a method is a function that is specific to a object class and is called within the context of that object. These methods were identified explicitly in claim 31. We understand there might be confusion whether the usage was the method name or the more generic English definition of the word. We have clarified this in all cases except claim 59 and the usage of find_route. In those explicit cases, it had been explicitly identified as a method name. I am assuming that in the volume of test this was missed. I understand there is a huge amount of material to be processed in a short time.

Item 9. The invention is a process for provisioning routes in an information network that embeds the route requirements in the route construction method of that process. This is a

unique and improved solution. This in turn is embedded in a process to provision a route that uses the minimum amount of network resources for the route. 35 USC 101 says that a process is statutory subject matter. We have added verbiage to the patent that describes the field of invention. We have also added flow diagrams that describe the process. We also believe that the precedent has already been established in this area. We have been issued a patent for a method of determining routes before. A number of other patents exist for similar processes. This invention meets 2 of the 4 measures of 35 USC 101. It is a process and a useful improvement of a process that has already been patented.

Item 10 Response in general. Zadakian (USP 6631134) describes how to select a path from a selection of paths so that the resulting path meets a plurality of routing characteristics of which only bandwidth, latency, physical path length, and cost are disclosed in the patent (his Claims 10, 11, 12, 13, 16, 17, 18, 21). Paths from lower levels act as links at higher levels. Zadakian does not define explicitly how a route is constructed nor does any of his claims relate to how a path is constructed. He states that a “QOS Shortest Path First path selection method is invoked”. That is outside the claims and in the Specification section. That method in the literature first builds a set of paths based solely on connectivity. Then it examines each of those paths to filter out the set that doesn’t meet the defined QOS.

This invention uses an entirely different method. The path construction process examines all the routing characteristics during path construction and only provides paths for the cache that meet ALL of the routing characteristics INCLUDING bandwidth. There is no

need for examining paths from the cache entry to see if they have the required bandwidth. All paths in the cache will have the requested bandwidth or they wouldn't be in the cache.

In "Summary of Invention" paragraph 3; The last 2 sentences Zadakian says "The steps of selecting a physical path and determining the available bandwidth for the physical path are repeated until either an acceptable physical path is found, or every one of the plurality of physical paths has been selected. If an acceptable physical path is found, the acceptable physical path is allocated." There is no discussion about how the allocation is done or any mechanism to prevent deadlock from multiple concurrent requests as is defined in this invention.

This description establishes a critical difference between Zadakian's methods and the methods of this invention. It also indicates that Zadakian's path construction algorithm uses a limited set of characteristics, probably only one, to construct a path AND it then must filter the path for meeting additional characteristics after construction is complete rather than during construction.

Zadakian in "Summary of Invention" describes his invention as a method to allocate bandwidth. The title of the invention is "Method for allocating bandwidth in an optical network". He does not describe it as a route determination method or offer any claims to support route determination.

Zadakian fills a cache with a set of “physical routes” through some method that is not explicitly defined within the patent and then describes how to filter those paths for a path that will meet the required routing characteristics. The correct operation of his invention depends upon having a multiplicity of cache entries for each source destination pair. This invention explicitly defines how routes are built so that they ‘a priori’ meet the routing requirements. Correct operation in general does not require the cache to have a multiplicity of entries. The primary reason to have a multiplicity of entries is for performance reasons. Cache fill is an expensive operation and the more entries that we have, the more requests for routes that we can fulfill between cache fills.

Item 10 Regarding Claim 1 can not anticipate the invention described.

Use of multiple level routing is a common practice in routing methods. Zadakian wasn’t the first to use it. It is part of the public “state of the art” and has been for decades.

Internet Protocol and ATM have been using multiple level routing for decades. Lower level paths are treated as one hop links in higher level networks.

Zadakian uses it in the traditional way. He makes no claim for path construction. That is outside the scope of his claims and outside his claim of invention. Zadakian uses Quality of Service in a very specific way that is implemented in TCP/IP in that there are a set of precedence ordered service levels that primarily relate to the precedence order of handling packets. This invention uses Quality of Service in a more generic way that is an extension of how ATM has defined Quality of Service. ATM provided multiple metric

values that are thresholds values for a variety of metrics rather than a simple precedence ordering of packet processing. This invention abstracts Quality of Service to be an unrestricted set of metrics that are required to be met before a connection can be established.

This invention uses multiple level routing to coerce “shortest path first” into “simplest shortest path first” routing. Further it describes that a route that can be met from the lowest level is by definition a “simplest route”. In the Specific Invention, that route is a lambda with no optical or electrical amplification or repeating from end to end. Zadakian uses levels to model the multiple levels of optical multiplexing that is used to allocate optical bandwidth.

Just because both inventions use a commonly used mechanism that are in the public domain does not say that one anticipates the other unless all the methods of one mirrors the methods of the other and we have already demonstrated that is not true.

Item 10 Regarding claim 2. Zadakian Fig. 1b is a typical network diagram of nodes and links. There is nothing that says it is represented in an array. There is nothing to indicate whether a link is half-duplex or full duplex. There is no description of the properties of the links or nodes. There is definitely nothing to indicate a cache fill process. The diagram is used as an example to show how virtual paths are used as links. It does not anticipate the standard data infra-structure of any provisioning application and definitely does not anticipate the data structures used for this invention.

Item 10 Regarding claim 2-6,9-12. Fig. 15 is a simplified flow diagram of iteratively scanning a set of paths between 2 end points and choosing the first path that meets the routing requirements. The claims in this invention describe common infra-structure to many network provisioning systems and are necessary parts of their construction. They can not be anticipated by Zadakian because of a simple flow chart and references that are only superficially similar. They claims are necessary components of the invention and have to be claimed to adequately claim the invention as a whole. The invention does not claim that it is the first such invention to use this infra-structure, nor can Zadakian if he does so. An invention needs to be unique in its composition and not necessarily in each of its components. This infra-structure is necessary for claiming a unique path construction that is used for cache filling. Zadakian does not claim path construction so he can not anticipate these claims.

Item 10 Regarding claim 7-8. These claims describe properties of optical fiber links and it can not be claimed that Zadakian anticipates them because they were not invented by Zadakian. As in the prior paragraph, these claims are part of a composition and do not have to be unique in isolation. They are necessary to adequately claim how the invention addresses these properties in its unique route construction methods.

Item 10 Regarding Claim 13. Zadakian can not anticipate the invention described.

You assert that “Zadakian discloses during cache fill”. Zadakian does not disclose how routes are created other than to say that an undisclosed “QoS based shortest path first (SPF) path selection method is invoked” . In the “Summary of the Invention” third paragraph there is a general description of routing that applies to all routing algorithms including Dijkstra’s algorithm and the classical maze running algorithm that is taught to first year computer science students. It is part of the public lore of Computer Science and thus can not be a basis of your asserted anticipation. In “Detailed Description of the Invention” paragraph 4, he says that a “QoS-based shortest-path first (SPF) path selection method is invoked” without further description of the method. Since Shortest Path First uses Dijkstra’s algorithm, it can not anticipate how this invention fills its cache.

This invention describes how routes are selected explicitly. It is the bulk of the claims. The Process is an improvement of classic maze running algorithm that uses a heuristic to prevent geometric growth of data during its execution. That heuristic is described in the invention as a set of pheromone metrics for each link in the routing table. You assert that Zadakian anticipated pheromone metrics. He can’t have anticipated the heuristic if he doesn’t explicitly describe his route building algorithm. SPF uses Dijkstra’s algorithm and it doesn’t use anything similar to the pheromone metric. It maintains a list of candidates for the next hop with an associated metric value if that hop is taken as its heuristic.

Zadakian never uses the term “pheromone metric” and never describes any heuristic for limiting the growth of paths to be considered during path building to fill a cache.

Item 10 Regarding claims 14-113 Zadakian can not have anticipated these because they all relate to path construction which he does not claim. The anticipation is based on simple diagrams and flow charts that discuss how to choose one of a set of possible paths as meeting the requirements of a routing request.

Summary of Item 10.

Both inventions are in the same area of invention. Both are solutions to similar problems. They both use similar terminology and public domain infra-structure. Both used multiple levels but for very different reasons. Zadakian uses levels for modeling the levels of optical multiplexing of bandwidth to allocate bandwidth.

This invention embeds the multiplicity of route requirements into the path construction method of filling the caches for path selection and will only put paths in the cache that WILL meet the requirements. It is a superior solution to the problem of constructing a route that meets all the routing requirements in one step. It uses caches of routes as a performance enhancer and not as a crutch because the underlying path construction algorithm can only create paths based upon connectivity information. The invention is described as software that is implemented on a general processor for network provisioning.

Zadakian builds possible paths from network connectivity alone and then scans those paths when a route is requested to see if any of the possible paths might meet the route

requirements. Zadakian doesn't claim or describe in detail how the paths are constructed for filling his caches. Zadakian also doesn't claim or describe a hierarchy of levels that are designed to constrain path construction to the lowest level of network resource usage. Zadakian doesn't even address minimization of network resources. There is no discussion of minimizing the use of optical/electrical repeaters, amplifiers, optical to electrical converters, or other network resources. There is no concern of allocation of bandwidth in an optimal way to prevent bandwidth fragmentation.

Zadakian simply claims a bandwidth allocation method that is imposed over an implied connectivity method. The primary unique thing that Zadakian does is to provide a method of arbitrating bandwidth between service providers and users. He is not concerned with how a route is constructed, that is outside the scope of his invention. He is primarily concerned with how a user selects the cheapest route that will meet his bandwidth requirements from a plurality of routes provided by competing services providers. See claims 25 and 26. Zadakian's invention is embedded in the communications equipment and is attempting to allow users an automated way to use the cheapest offering that has adequate bandwidth for a particular service level.

There are details that are similar, but the compositions of the two inventions are very different. They solve different problems in different ways. Most of the similarities are that they are in the same field of invention and their descriptions draw upon a wealth of public domain and industry specific literature that provides a pool of terminology for description.

Item 11. As explained above Zadakian has not anticipated this invention. I have done a search of existing patents and published applications and can not find another patent that anticipates this invention.

Item 12. My responses to Item 10 explain why Zadakian does not anticipate any of the claims. He only uses similar terminology. His invention is limited to choosing one of many paths previously defined by an undisclosed process that has suitable bandwidth to meet a Quality of Service requirement. My invention includes a route determination process that returns routes that meet a plurality of Quality of Service requirements. Many of the 113 claims describe the process of creating routes which Zadakian does not disclose any process for doing.

Item 12 claim 1. As stated many times in this response, Zadakian chooses one of a plurality of routes that have been determined by an undisclosed process. My invention creates a plurality of routes that meet the Quality of Service requirements. It discloses the process that is used to create the routes which Zadakian does not do. The infra-structure described in claim 1 is public domain and it is well defined in the literature well before Zadakian filed for his patent. His use is the same as our use. It is a standard infra-structure that the more detailed claims improve upon. It can not be considered in isolation from the claims that improve upon it.

Item 12 claim 2-6. Both inventions use a similar infra-structure. The infra-structure defined is not Zadakian's invention. It is found in text books on graph theory and is a common infra-structure for route selection processes like Zadakian's and as used in our invention which is a route determination process. An invention can use existing and known elements as long as the composition of those elements is unique or improvements. My invention does not claim that claim 2 in isolation is an invention. It only uses claim 2 as a necessary infra-structure that other claims will improve upon. To reject the claim, it is necessary to show that another invention has the same composition of claims that are dependent on this claim. I have explained why Zadakian in particular does not apply. He has no route determination process. If it were possible to reject this claim in isolation, then the same would be true of Zadakian and his patent should never have been approved because the structure is described in prior art and in isolation can not be patented. Specifically Zadakian does not disclose his cache fill process and that single difference is enough to refute the rejection of claim 2. Further no part of the components of claim 2 that are common to Zadakian are unique to Zadakian. They are all in the public domain infra-structure.

He and the public domain implementations do not specify a set of metric properties that are specific to each level of a routing structure. Zadakian is primarily concerned with bandwidth as the title of his patent illustrates. He treats levels homogeneously and does not provide any specialization for levels. He discloses his use of levels as a route simplification scheme and I can assume that it is the industry standard of establishing PVC connections in a network, that higher levels treat as a physical link. Multiple level

routing is a common public domain mechanism and is used for a variety of uses. It is not unique to Zadakian and has been in use since the earliest days of Telephony. In Telephony they have trunk connections that are multiple hop connections that a user connection uses as if it were a 1 hop connection. These have been in use since the early 1920's. Their use in data networks was well established in the 1970's by ATT and IBM.

Zadakian does not disclose any process to age out his cache entries as we do in 2h.

Zadakian does not specify a resource reservation and commitment method as specified in claim 2g. This is a necessary addition for multiple concurrent requests to prevent deadlock in route selection. One of the requirements of an inventor is to disclose the best methods known in his invention. This is a well known issue and Zadakian did not anticipate it.

Claim 2 is based upon the public domain use and is an improvement of that use and in no component is its use unique to Zadakian.

Item 12 claim 7-113. I have read Zadakian multiple times and find that Zadakian makes no such claims. I would ask that the examiner provide the specific claim's in Zadakian's patent for each of the claims he asserts that Zadakian anticipates.

Item 13. of Response to Arguments. I do not see why previous responses were not persuasive. I have logically demonstrated that Zadakian's invention is only superficially

similar at a superficial level and that it does not address the majority of the claims for route construction.

Response 14. The route determination process is a critical component for a software provisioning application that is implemented on a general purpose processor using a standard operating system, Linux in our case. The practical value is that it can do in seconds what is currently taking days with spreadsheets. The system has been demonstrated to 3 different equipment manufacturers that have expressed interest in acquiring it once the prototype is fully functional. Each is interested in integrating it into their provisioning environment that differ as to processing equipment and operating system. This application concentrates on the critical process that is unique rather than on the general provisioning system that it is a part of.

35 USC 101 “Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new useful improvement thereof, may obtain a patent therefore, subject to the conditions and requirements of this title. “

We have demonstrated that this is an improvement over traditional provisioning systems. Providing routes that use minimum optical resources is a tangible result. The “post solution activity” is provisioning an optical route through an optical network and conserving expensive resources. All 3 equipment vendors we are discussing selling the application to, see the availability of this critical component as providing them a competitive advantage.

Response 15 – This invention fully discloses path exploration and construction. Zadakian does either claim path construction. Zadakian asserts that a plurality of physical paths exist and they are available to via an iterator to select the first of them that meets the

Quality of Service. Zadakian does not use the term cache in his claims or in his patent description. I have read and reread it multiple times looking for the reference to a cache or a cache fill process that could anticipate the claims of this invention. The only use of the word cache is in the General Description under Software Architecture in the second paragraph along with a description of Eproms, Flash Memory, and the types of memory that is available to the OS. Claim 7b says “selecting a physical path between said first node and second node from a plurality of such physical paths”. Summary of the Invention the third paragraph contains “Next, a physical path between the first and the second nodes is selected from a number of such physical paths. The service provider then determines whether the physical path has enough available bandwidth to meet the bandwidth requirement of the requested virtual path.” Detailed Description third paragraph contains “An QoS-based shortest-path first (SPF) path selection method is invoked to calculate the best route for the new connection.” Fig. 15 shows a process of requesting paths from an unspecified source of paths and iterating through the paths until there are none available or a path has been found. This is as much as the patent discloses about the source of paths that it is selecting on from.

I have no idea how this can presume to anticipate a cache structure disclosed in our invention or a path exploration and path determination process.

I appreciate that the examiner has a difficult job to do under difficult circumstances. I appreciate the amount of effort that is required to understand a patent of this complexity, especially dealing with an individual inventor rather than a patent attorney. I am hoping that the examiner can also appreciate that I am dealing with a very daunting task in trying

to deal with a complex environment of which I have minimal experience. This submission is very important to me. It is my future and I am doing the absolute best I can. Thank you for your consideration.